

## WHAT IS CLAIMED IS:

1. A method for manufacturing an optical waveguide using a laser direct writing method, comprising:
  - coating clad material on a substrate;
  - 5 coating photo-sensitive polymer on said clad material as a core layer;
  - and
  - forming the optical waveguide using a laser beam having Gaussian distribution,
  - wherein the step of forming the optical waveguide includes the step of
  - 10 overlapping at least two laser beams.
2. The method according to claim 1, wherein each of the at least two laser beams has difference each other in at least one of the beam's size, the beam's intensity and writing speed.
- 15 3. The method according to claim 2, wherein the refractive index profile of the optical waveguide is asymmetrical.
4. The method according to claim 1, wherein said optical
- 20 waveguide is formed with a bending structure.
5. The method according to claim 4, wherein in the overlapped beam of said bending structure, the refractive index of the beam in the outside is larger than that of the beam positioned in the inside.

6. The method according to claim 1, wherein the number of said laser beams is two, the size and length thereof is few  $\mu\text{m}$ .

5 7. The method according to claim 1, wherein the step of overlapping the at least two laser beams comprising:

forming a first bending-shaped optical waveguide using a first laser beam; and

10 forming a second bending-shaped optical waveguide having two portions using a second laser beam, wherein the each portion of the second bending-shaped optical waveguides are formed on sides of the first optical waveguides, crossed each other with respect to the center of the bending curve of the first optical waveguide,

15 wherein the first bending-shaped optical waveguide overlaps the second bending- shaped optical waveguide.

8. An optical waveguide formed by a laser direct writing method, comprising:

20 a substrate;  
clad material coated on said substrate; and  
photo-sensitive polymer coated on said clad material as a core layer,  
wherein the refractive index profile of said core layer has a structure of overlapping at least two laser beams having Gaussian distribution , spaced a predetermined distance apart each other.

9. The optical waveguide according to claim 8, wherein said optical waveguide has a bending structure, and the refractive index of the beam in the outside of said bending structure is larger than that of the beam in the inside.

10. The optical waveguide according to claim 7, wherein said at least two optical waveguides comprise a first bending-shaped optical waveguide using a first laser beam and a second bending-shaped optical waveguide having two portions using a second laser beam, wherein the each portion of the second bending-shaped optical waveguide is formed on side of the first optical waveguides, crossed each other with respect to the center of the bending curve of the first optical waveguide,